CLAIMS

The embodiment of the invention in which an exclusive property or privilege is claimed is defined as follows:

1. A method for high spatial resolution imaging of x-ray and gamma radiation comprising:

a) supplying a plurality of sources of radiation; and

b) focussing said radiation onto one or more detectors by means of diffracting crystals having a width not exceeding the resolution;

c) analyzing said focused radiation to collect data as to the type and location of the radiation; and

d) producing an image using the data.

2. The method as recited in claim 1 wherein the step of supplying said sources of radiation further comprises contacting a body with a radioisotope.

3. The method as recited in claim 1 wherein said image is produced by an array of detectors.

4. The method as recited in claim 1 wherein the step of arranging said crystals further comprises cutting said crystals into thin slabs and bending said cut crystals to assume the shape of circular arcs.

5. The method as recited in claim 1 wherein said width is 1mm or less.

6. The method as recited in claim 1, further comprising selecting said crystals to have random imperfections and dislocations produce a rocking angle of between 50 and 150 seconds of arc.

7. The method as recited in claim 1 wherein the step of analyzing said focused radiation further comprises directing said focused radiation to a plurality of detectors with a resolution of 1 mm or less.

8. The method as recited in claim 1 further comprising positioning one or more collimators with narrow width apertures between said sources and said detectors and adjusting the position and widths of said apertures to improve said resolution.

9. The method as recited in claim 4 wherein the step of supplying a plurality of said sources of radiation further comprises placing at least one of said sources at precisely known locations.

10. A device for high spatial resolution imaging of a plurality of sources of x-ray and gamma-ray radiation comprising:

a) a means for locating the sources of radiation;

b) a plurality of diffracting crystals of a width not exceeding the resolution for focussing the radiation emanating from the located sources and directing it to a plurality of detectors;

c) detector arrays for analyzing said directed radiation to collect data as to the type and location of the radiation; and

d) a means for converting the data to an image.

11. The device as recited in claim 10 wherein the means for locating the sources is a plurality of scintillation devices.

12. The device as recited in claim 10 wherein the diffracting crystals form a plurality of lenses.

13. The device as recited in claim 10, where the diffracting crystals and the sources are movable.

14. The device as recited in claim 10 wherein the radiation sources are radioisotopes.

15. The device as recited in claim 12 wherein each lens comprises a plurality of crystals and wherein the crystals are oriented so as to diffract radiation of a predetermined energy to the same focal point.

16. The device as recited in claim 12 wherein the crystals are mounted in concentric rings onto a substrate.

17. The device as recited in claim 12 wherein the crystals are bent.

18. The device as recited in claim 10 further comprising one or more collimators with apertures positioned medially between the sources and the detectors and wherein the width and position of said apertures is adjustable.

19. The device as recited in claim 10 wherein said crystals contain random imperfections and dislocations that produce a rocking angle of between 50 and 150 seconds of arc.

20. The device as recited in claim 10 wherein said detectors in said detector arrays have a resolution of 1 mm or less.